



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,656	03/09/2004	Yoshitaka Hamada	035576/275601	2186
826	7590	03/22/2006	EXAMINER	
ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000			SMOOT, STEPHEN W	
			ART UNIT	PAPER NUMBER
			2813	
DATE MAILED: 03/22/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

EFL

<b>Office Action Summary</b>	<b>Application No.</b> 10/796,656	<b>Applicant(s)</b> HAMADA ET AL.	
	<b>Examiner</b> Stephen W. Smoot	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2004 and 19 December 2005.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3-9-04; 12-20-05</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

This Office action is in response to application papers filed on 09 March 2004, which includes a preliminary amendment that has been entered, and to applicant's election filed on 19 December 2005.

### ***Election/Restrictions***

1. Applicant's election with traverse of Group I, claims 1-6, in the reply filed on 19 December 2005 is acknowledged. The traversal is on the grounds that the search of both inventions would not be burdensome to the examiner. This argument is found to be persuasive. Accordingly, the restriction requirement is withdrawn and claims 1-13 will be examined on the merits.

### ***Specification***

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Composition for Forming a Porous Film Prepared by Hydrolysis and Condensation of Alkoxysilane Using a Trialkylmethylammonium Hydroxide Catalyst.

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-4, 6-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claim 1, as currently amended, includes the limitation "10 ppb or less metallic impurity" in line 2. Likewise, independent claim 9 includes the limitation "10 ppb or less metallic impurity" in line 3. This limitation is inconsistent with the applicant's original disclosure, including the original claims 1, 9 and the specification (see page 15, line 15), all of which indicate 100 ppb or less metallic impurity.

Art Unit: 2813

Accordingly claims 1, 9 as currently amended are indefinite because they take on an unreasonable degree of uncertainty per MPEP section 2173.03.

Claims 2-4, 6-8 are rejected under 35 U.S.C. 112, second paragraph, because they depend on claim 1 and claims 10-13 are rejected under 35 U.S.C. 112, second paragraph, because they depend on claim 9.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4, 6-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurosawa et al. (US 6,410,150 B1).

Referring to column 17, lines 31-42 and column 18, lines 17-26, Kurosawa et al. disclose a composition that is prepared by hydrolysis and condensation of a mixture of methyltrimethoxysilane and tetraethoxysilane using tetramethylammonium hydroxide as a catalyst. The methyltrimethoxysilane is the as-claimed formula (3), wherein Z is methoxy (an alkoxy group with one carbon) and R is methyl (a hydrocarbon group with one carbon), the tetraethoxysilane is the as-claimed formula (4), wherein Z is ethoxy (an alkoxy group with two carbons), and the tetramethylammonium hydroxide catalyst is the

Art Unit: 2813

as-claimed formula (5), wherein R is methyl (an alkyl with one carbon). These are all of the structural limitations set forth in claim 1 of the applicant's invention. Regarding the halogen impurity limitation and the metallic impurity limitation, these are property limitations that are presumed to be inherent to the composition of Kurosawa et al., per MPEP section 2112.01, because their composition is substantially identical to applicant's composition as claimed in claim 1.

Regarding claim 2, the catalyst is used for the hydrolysis and condensation of the alkoxysilanes, and is not part of the resulting composition. Accordingly, the limitation of claim 2 featuring the trialkyl component of the catalyst having 4 to 15 carbons, is a process limitation that would yield a composition that is not distinguishable from the above composition of Kurosawa et al. Per MPEP section 2113, the burden is now shifted to the applicant to show an unobvious difference between their composition as claimed in claim 2 and the composition of Kurosawa et al., since these compositions are believed to be substantially identical.

Regarding claim 3, this is a process limitation for forming the trialkylammonium hydroxide and, as in claim 2, would yield a composition that is not distinguishable from the above composition of Kurosawa et al. Per MPEP section 2113, the burden is now shifted to the applicant to show an unobvious difference between their composition as claimed in claim 3 and the composition of Kurosawa et al., since these compositions are believed to be substantially identical.

Regarding claim 4, the weight average molecular weight of the above composition disclosed by Kurosawa et al. is 1,000,000 (see column 18, lines 20-24).

Art Unit: 2813

Regarding claims 6-7, Kurosawa et al. further disclose coating a silicon wafer with the above composition, drying the film at 80 degrees C and at 200 degrees C, and heating the dried film at 340 degrees C, 360 degrees C, 380 degrees C, and 400 degrees C to form a film (see column 19, line 42 to column 20, line 3). It is implicit from the disclosure of Kurosawa et al. that the resulting film is porous because they disclose a density of  $1.3 \text{ g/cm}^3$  (see Table in column 20).

Regarding claims 8-9, 13, Kurosawa et al. further disclose that the film can be used as interlayer insulating films for semiconductor devices and, more specifically, that the insulating film can be interposed between metallic wirings (see column 16, lines 4-17).

Regarding claim 10, the catalyst is used for the hydrolysis and condensation of the alkoxysilanes, and is not part of the resulting semiconductor device. Accordingly, the limitation of claim 10 featuring the trialkyl component of the catalyst having 4 to 15 carbons, is a process limitation that would result in a semiconductor device that is not distinguishable from the above semiconductor device of Kurosawa et al. Per MPEP section 2113, the burden is now shifted to the applicant to show an unobvious difference between their semiconductor device as claimed in claim 10 and the semiconductor device of Kurosawa et al., since these products are believed to be substantially identical.

Regarding claim 11, this is a process limitation for forming the trialkylammonium hydroxide and, as in claim 10, would yield a semiconductor device that is not distinguishable from the semiconductor device of Kurosawa et al. Per MPEP section

Art Unit: 2813

2113, the burden is now shifted to the applicant to show an unobvious difference between their semiconductor device as claimed in claim 11 and the semiconductor device of Kurosawa et al., since these products are believed to be substantially identical.

Regarding claim 12, the weight average molecular weight of the above composition disclosed by Kurosawa et al. is 1,000,000 (see column 18, lines 20-24).

### ***Claim Rejections - 35 USC § 103***

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurosawa et al. (US 6,410,150 B1) in view of Shimizu et al. (US 4,634,509 – from applicant's IDS filed on 09 March 2004).

Referring to column 17, lines 31-42 and column 18, lines 17-26, Kurosawa et al. disclose a method for manufacturing a composition that is prepared by hydrolysis and condensation of a mixture of methyltrimethoxysilane and tetraethoxysilane using tetramethylammonium hydroxide as a catalyst. The methyltrimethoxysilane is the as-claimed formula (3), wherein Z is methoxy (an alkoxy group with one carbon) and R is methyl (a hydrocarbon group with one carbon), the tetraethoxysilane is the as-claimed formula (4), wherein Z is ethoxy (an alkoxy group with two carbons), and the tetramethylammonium hydroxide catalyst is the as-claimed formula (5), wherein R is methyl (an alkyl with one carbon). These are limitations set forth in claim 5 of the applicant's invention.

However, Kurosawa et al. lack the limitation of the trialkylammonium hydroxide being a reaction product of trialkylamine and dimethyl carbonate, which is also a limitation of claim 5.

Referring to column 6, lines 3-48, Shimizu et al. teach the formation of tetramethylammonium hydroxide by reacting trimethylamine (methyl being an alkyl corresponding to one carbon) with dimethyl carbonate.

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Kurosawa et al. and Shimizu et al. in order to form the tetramethylammonium hydroxide of Kurosawa et al. by reacting trimethylamine with dimethyl carbonate, as taught by Shimizu et al. Shimizu et al. recognize that their method is an inexpensive way to form tetramethylammonium hydroxide of high purity and in high yields (see column 9, line 59 to column 10, line 21).

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Basil et al., Smith et al., and Wu et al. teach compositions that are formed by the hydrolysis and condensation of alkoxysilane using tetraalkylammonium hydroxide as a catalyst.

Art Unit: 2813

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS

  
**STEPHEN W. SMOOT**  
**PRIMARY EXAMINER**